SECTION 00 01 10

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SECTIONS **PAGES**

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Division 0 – Bidding & Contract Requirements

.2 General Requirements

.3 All Electrical Drawings and Division 25, 26, 27, 28 Series Specification Sections.

1.2 REFERENCES

.1 CAN3-C235-83 (R2015) - Preferred Voltage Levels for AC Systems, 0 to 50 000 V.

.2 CSA (Canadian Standards Association).

.1 CSA-C22.1-21 - Canadian Electrical Code, Part I (25th Edition), Safety Standard for Electrical Installations.

.3 Electrical and Electronic Manufacturer's Association of Canada

.1 EEMAC 2Y-1[-1958], Light Gray Colour for Indoor Switch Gear

.4 ULC (Underwriters' Laboratories of Canada).

1.3 REGULATORY REQUIREMENTS

.1 Conform to CSA-C22.1-21.

.2 Comply with all CSA Electrical Bulletins in force at time of tender submission.

.3 Comply with all [provincial] [territorial] by-laws, ordinances, codes, rulings, and other requirements.

.4 Comply with requirements of the electrical supply authority and the local inspection authority.

.5 Products: Listed and classified by CSA, or ULC and as suitable for the purpose specified and indicated. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from the appropriate Inspection Departments.

1.4 DEFINITIONS

.1 The following are definitions of terms and expressions used in the specification:

.1 **Consultant:** Electrical Engineering Consultant: Epp Siepman Engineering Inc.

.2 **Defective:** A condition determined exclusively by the Consultant.

.3 **Demolish:** The complete removal of the existing item identified complete with associated infrastructure back to last remaining device or source as required to accommodate the overall scope of work. Demolished items shall be legally disposed of off site.

.4 **Electrical Code:** Canadian Electrical Code or Local Code in effect at project location.

.5 **Exposed:** Any work not concealed in wall, shaft, or ceiling cavities or spaces. Work behind doors, in closets or cupboards or under counters is considered exposed.

.6 **Indicated:** as shown on contract drawings or noted in Contract Documents.

.7 **Inspection Authority:** agent of any authority having jurisdiction over construction standards associated with any part of electrical work on site.

.8 **Install:** To remove from site storage, move or transport to intended location, install in position, connect to utilities, repair site caused damage, and make ready for use.

.9 **New:** Produced from new materials.

.10 **Provide:** Wherever the term "provide" is used in relationship to equipment, conduit and other materials specified for the work, it means "supply, install, connect and leave in working order all materials and necessary wiring, supports, access panels, etc., as necessary for equipment indicated." Wherever the terms "provide" is used in connection with services such as testing, load balancing, start-up, preparation of drawings for any part of the work, it means procure, prepare, supervise, take responsibility for, and pay for these services.

.11 **Relocate:** The complete relocation of the existing item identified to the new location as indicated, modifying the existing infrastructure as required to accommodate the relocation and overall scope of work.

.12 **Remove and Reinstall:** The temporary removal of the existing item identified complete with associated infrastructure to accommodate the overall scope of work, the temporary storage of the item, preparing the item for reuse, and reinstallation of the item as indicated.

.13 **Remove and Replace:** The complete removal and replacement of the item identified in its current location, with a new item, modifying the existing infrastructure as required to accommodate the overall scope of work.

.14 **Renewed:** Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.

.15 **Supply:** To acquire or purchase, ship or transport to the site, unload, remove packaging to permit inspection for damage, re-package, replace damaged items, and safely store on-site.

.16 **Supply Authority:** electrical power utility company responsible for delivery of electrical power to project.

.17 **Typical:** A representative characteristic that is standard for all installations whether individually noted or not throughout the documents. "Typical" applies to each individual or combined installation except where specifically noted or otherwise indicated that the application is non-typical.

1.5 ABBREVIATIONS

.1 The following are common abbreviations used in the specification:

.1 **AFF:** Above finished floor.

.2 **AFG:** Above finished grade.

1.6 PERMITS & FEES

.1 Submit all quantities of drawings and specifications necessary for examination and approval to Electrical Permit Department and Electrical Supply Authority prior to commencement of work.

.2 Obtain and pay for all permits necessary for the electrical installation.

1.7 INSPECTION

.1 Furnish a Certificate of Acceptance from the Inspection Authorities on completion of work. Copies of Certificate shall be included in Maintenance Manuals.

.2 Certificate of Inspection and Approval shall be submitted before final payment may be considered to be due.

.3 During the course of the project construction, the Consultant will carry out periodic site reviews and prepare a deficiency list for remedial action by the Electrical Subcontractor. When requested, the Electrical Contractor shall respond in writing to the Consultant, stating corrective action and completion date for each item listed as deficient. This response shall be in the hands of the Consultant within three working days of receipt of the Site Review Report.

1.8 PRODUCT CHANGES & SUBSTITUTIONS

.1 Change in Product/Products: Submit request for substitution or alternative in accordance with this Section, the Instructions to Bidders, and Division 01 Product Exchange Procedures Division 01 Substitutions Sections. In case of a discrepancy between this section and Division 00 and Divisions 01, the more stringent requirements shall apply.

.2 The Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this section.

.3 Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

.4 Any substituted item submitted for consideration must not exceed the available space limitations, and all additional costs for mechanical, electrical, structural and architectural revisions required to incorporate the substituted material shall be the responsibility of the Electrical Division. Review maximum dimensions and weights when provided in the specification and schedules, and where not specified review the drawings for space limitations.

.5 A request constitutes a representation that the Bidder:

.1 Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.

.2 Will provide the same warranty for the Substitution as for the specified Product.

.3 Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to The City of Winnipeg.

.4 Waives claims for additional costs or time extension which may subsequently become apparent.

.5 Will reimburse The City of Winnipeg and Consultant for review or redesign services associated with re-approval by authorities.

.6 Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

1.9 SUBMITTALS FOR REVIEW

.1 Refer to Division 01.

.2 Progress Payment Application Template

.1 Prior to the first application for payment, submit for review a draft progress application template.

.2 Progress Application shall contain separate line items for the following systems:

.1 Site Services

.2 Distribution Equipment including Panels, Distribution Panels, Transformers, etc.
.3 Emergency Generator and Standby Power Systems
.4 Lighting
.5 Lighting Controls
.6 Branch Wiring, Conduit, Raceway, Boxes
.7 Exit & Emergency Lighting
.8 Electric Heat
.9 Electric Vehicle Charging
.10 Photovoltaics
.11 Sound Masking
.12 Voice/Data
.13 Paging
.14 Audio/Visual Systems
.15 Intercom
.16 Fire Alarm
.17 CCTV
.18 Intrusion
.19 Access Control
.20 Duress
.21 Nurse Call
.22 Infant Abduction
.23 Close Out (As-Builts, O&Ms)

.3 Progress for each system shall break out labor and materials separately.

.3 Shop Drawings Administrative Requirements

.1 **Shop drawings shall be submitted electronically in PDF format documents to** shopdrawings@eppsiepman.com.

.2 Shop drawing documents **shall be grouped by specification section**. Clearly list the specification section on the front page or cover sheet of the submittal. Shop drawings related to **multiple sections may not be grouped together** into a single document. Documents that are groups incorrectly will be returned without being examined and shall be considered rejected.

.1 Each drawing shall include the name of project as found on the drawings or specifications, the equipment supplier and the specification section that the equipment is specified under.

.3 Submit to Consultant submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.4 Work affected by submittal shall not proceed until review is complete.

.5 Present Shop Drawings, product data, samples and mock-ups in SI Metric and/or Imperial inch-pound units, to match the units used in the schedules.

.4 Shop Drawings and Product Data

.1 Submit shop drawings and product data for review by the Consultant. All drawings shall be in English and metric dimensions or in imperial where indicated. Manufacture of equipment shall not commence until shop drawings have been reviewed.

.2 Material submitted for review shall be marked up bear the Contractor's and where applicable the Utility's reviewed stamp.

.3 Shop drawings shall be reviewed by the electrical contractor, general contractor, and where applicable the Utility prior to submittal to Consultant, confirming that they meet all the design requirements. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents.

.4 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.

.5 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.6 Where applicable, include wiring, single line and schematic diagrams.

.7 Include wiring drawings or diagrams showing inter-connection with work of other sections.

.5 Provide scaled drawings showing layout of all electrical equipment and coordination of same with mechanical equipment in all electrical, electrical/mechanical and voice data rooms.

.6 Submit samples in accordance with General Conditions. Samples shall be forwarded to the Consultant's office and returned. Approved samples will be retained until after tender closing, then all samples will be returned except for the sample submitted by the Manufacturer who has been listed by the successful Contractor in the tender documents. This sample will be used for comparison with the actual production run of successful manufacturer.

.7 Submit shop drawings of service entrance equipment to utilities.

1.10 CLOSEOUT SUBMITTALS

.1 Refer to Division 01.

.2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.3 Four (4) weeks prior to Substantial Performance of the Work, submit to the Consultant, one (1) draft copy of operating and maintenance manuals in Canadian English.

.4 Copy will be returned with Consultant's comments.

.5 Revise content of documents as required prior to final submittal.

.6 Two (2) weeks prior to Substantial Performance of the Work, submit to the Consultant, three (3) final copies of operating and maintenance manuals in Canadian English.

.7 Summary audit documents associated with requirements for LEED classification documentation.

.8 Maintenance Data:

.1 Provide operation and maintenance data for incorporation into Maintenance Manuals.

.2 Include details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.

.3 Include technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.

.4 Include all warranty information.

.5 Submit Maintenance Manuals to the Consultant for review. Manuals that are incomplete shall be returned to the Electrical Sub-Contractor for completion. Completed manuals shall be submitted, to the satisfaction of the Consultant, before final payment may be considered to be due.

.6 Format

.1 Refer also to Section 01 78 10 for formats for manuals. Where there is a discrepancy with this section, follow the requirements of 01 78 10.

.2 Organize data in the form of an instructional manual.

.3 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 8.5 x 11 inch (219 x 279 mm) with spine and face pockets.

.4 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.5 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.6 Arrange content by systems under Section numbers and sequence of Table of Contents.

.7 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.8 Text: Manufacturer's printed data, or typewritten data.

.9 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.7 Contents

.1 Refer also to Section 01 78 10 for formats for contents. Where there is a discrepancy with this section, follow the requirements of 01 78 10.

.2 Table of Contents: Provide:

.1 Title of project.

.2 Date of submission.

.3 Names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

.4 Schedule of products and systems, indexed to content of volume.

.3 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.4 Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

.5 Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control, wiring, and schematic diagrams and performance curves.

.6 Include Systems Certifications where applicable.

.7 Include manufacturer specific warranties where applicable.

.8 Include a list of maintenance materials provided in each related section.

.9 Certificate of Acceptance: Relevant certificates issued by authorities having jurisdiction, including code compliance certificate, life safety systems performance certificate.

.10 Training: Record of The City of Winnipeg's representative training as specified.

.9 Maintenance Materials:

.1 Provide maintenance materials as specified. Include a list of the maintenance materials in each related section of the operation and maintenance data.

.2 Turn materials over to The City of Winnipeg in an orderly fashion upon completion of installation.

1.11 EXAMINATION

.1 Prior to submitting a tender, examine the site and local conditions which will affect the work. Refer to the Architectural, Mechanical and Structural drawings, schedules and specifications for construction details to be certain that the electrical work can be satisfactorily carried out as specified. Claims for extra payments resulting from conditions which could reasonably be foreseen during an examination of the documents and/or site, will not be recognized.

.2 Ensure that all equipment designated as "Existing to Remain" or "Existing to be Relocated" is suitable for its intended re-use, including panelboards and circuits. Report any discrepancies to the Consultant before tender close.

.3 Refer to General Conditions for instructions regarding a prearranged site visit during the tender period.

.4 Notify Consultant of any discrepancies, omissions, etc., prior to the awarding of the contract, otherwise the Electrical Contractor shall perform the work as directed at no additional cost to The City of Winnipeg.

1.12 EFFICIENCY MANITOBA

.1 Electrical contractor shall make application on behalf of The City of Winnipeg for the Efficiency Manitoba Incentive for all available rebates under the Commercial Lighting Program.

.2 Application shall be made and acceptance provided by Efficiency Manitoba prior to commencement of demolition.

.3 Electrical Contractor shall gather all information as required to complete the application.

.4 Electrical Contractor shall provide updates to The City of Winnipeg regarding status of the application and expected rebates.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Provide labour, materials, transportation, equipment and facilities, etc., required for the complete electrical installation as indicated or implied on the drawings and specifications.

.2 Electrical equipment shall be new and of type and quality specified.

.3 Request for approval of material, as equal, shall conform to the specification.

.4 Equivalent materials and equipment

.1 Bidders shall submit a tender based on the specified materials and equipment only.

.2 Bidders may submit a tender based on equivalent materials and equipment only if such items have been approved as equals by the Consultant.

.3 Bidders may submit, with their tender, an alternate price based on alternate materials and equipment only if such items have been approved as alternates by the Consultant.

.4 Submissions for equals or alternates shall be received by the Consultant, ten (10) working days prior to tender closing. Submissions shall include sufficient manufacturer's data to clearly show equivalency, as well as an itemized list of equal or alternate items, the items for which they were submitted and a space for the Consultant to indicate "approved equal", "approved alternate", or "not approved". Submittal list will be returned or may be picked up at the Consultant's office. Where submissions are not returned by the Consultant before tender closing or are not received by the Consultant ten (10) working days before close of tender, they are considered not approved.

.5 All submissions shall include the following phrase "We have reviewed all contract documents, contract drawings and specifications relating to the equipment presented herein" and shall bear the name and signature of the manufacturer or their agent.

2.2 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83(R2015).

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment shall operate in extreme operating conditions established in above standard without damage to equipment.

2.3 FINISHES

.1 Finish outdoor electrical equipment such as parking lot panels, to match light standards.

.2 Paint indoor switchgear light grey to EEMAC-2Y-1.

.3 Paint indoor distribution enclosure trims light grey to EEMAC-2Y-1. Distribution tub shall be galvanized.

.4 Paint outdoor electrical equipment enclosures with two (2) coats of U.V. resistant Urethane Enamel to minimum 1.5 mil dry coat thickness. Colour shall be "equipment green" to EEMAC 2Y-1.

.5 Clean and touch up surfaces of shop-painted equipment, scratched or marred during shipment or installation, to match original paint.

.6 Clean, prime and paint exposed wiring, conduit, junction and pull boxes, hangers, racking, and fasteners to prevent rusting and to match surrounding finishes where applicable.

2.4 LABELS AND WARNING SIGNS

.1 Manufacturer's nameplates and CSA labels shall be visible and legible after equipment is installed.

.2 Provide warning signs on equipment, as required, to meet the requirements of the Inspection Authorities, including indication of multiple power sources.

.3 Provide quantity as required of buried cable signs reading "Buried Cable" and "Buried High Voltage Cable". Signs shall be installed at building structure/equipment, at locations as directed on site and as per Canadian Electrical Code.

2.5 PROTECTION

.1 Guards

.1 Provide guards for all electrical equipment and devices in gymnasium and other areas subject to damage.

.2 Sprinkler Proof Equipment

.1 All surface mounted electrical equipment located in sprinklered areas shall be sprinkler proof and shall be provided with suitable hoods and shields.

.2 Entrance of conduits into the top of surface mount electrical panels/cabinets/distributions and motor control centers shall utilize O-rings and watertight connectors.

.3 All recessed mounted branch circuit panels and distribution panels shall be provided with a Type 2 enclosure.

.3 Construction

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live part "LIVE ( ) VOLTS", with appropriate voltage.

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision.

2.6 SPARE PARTS AND MAINTENANCE MATERIALS

.1 Assemble spare parts as specified.

.2 Include the following:

.1 Part number.

.2 Identification of equipment or system for which parts are applicable.

.3 Installation instructions as applicable.

.3 Provide a written list complete with The City of Winnipeg's signature assuring that spare parts have been received by The City of Winnipeg.

PART 3 EXECUTION

3.1 COORDINATION WITH OTHER TRADES

.1 Refer to Mechanical, Structural, Architectural and Interior Design drawings and specifications for additional electrical work in connection with other Divisions. Where such work is included in other sections of the specifications, provide equipment, conduit, wiring, etc. (in accordance with the approved manufacturer's shop drawings), as required, for operation of the specified equipment.

.2 Schedule execution of electrical work with associated work specified in other Divisions.

.3 Coordinate electrical work with work of other trades to avoid conflicts with pipes, air ducts or other equipment. Provide additional supports, wiring, etc., to relocate electrical equipment, as required, where structural members, air ducts, piping or other equipment interferes with the electrical installation.

.4 Prior to installation provide scaled drawings of all mechanical/electrical rooms and communication rooms showing layout of all equipment (mechanical and electrical) for Consultant review.

.5 Interference Drawings:

.1 Provide interference drawings showing the exact location of all [ceiling mounted electrical devices] [devices recessed in concrete] […]. Provide dimensioned drawings showing all conduit routing and junction boxes. All interference drawings shall be approved by the architect prior to rough-in.

3.2 QUALITY ASSURANCE

.1 Do complete installations in accordance with CSA C22.1-21.

.2 While not identified and specified by number in this Division, comply with CSA Electrical bulletins in force at time of tender submission. Comply with the requirements of all Provincial and local laws, rules, ordinances and codes.

.3 Electrical installations shall comply with all requirements of the electrical supply authority and the inspection authority.

.4 Electrical installation shall be in accordance with the applicable versions of the Canadian Electrical Code, Provincial and other codes, rules and regulations. Supply material and labour required to meet the requirements of these codes, rules and regulations even though the work in not shown on the drawings or mentioned in the specifications. Where the electrical installation calls for better quality materials or construction than the minimum requirements of these codes, rules and regulations, the electrical installation shall be as shown on the drawings and as specified.

3.3 WORKMANSHIP

.1 Install equipment, conduit and cables in a workmanlike manner to present a neat appearance to the satisfaction of the Consultant. Install conduit and cable runs parallel and perpendicular to building lines in chases, behind furring or above ceilings, where such concealment is possible. In areas where systems are to be exposed, install neatly and group in a tidy appearance.

.2 Install equipment/junction boxes and apparatus requiring maintenance, adjustment or eventual replacement, with adequate clearances and accessibility for same.

.3 Provide for all requirements shown on shop drawings or manufacturer's installation instructions.

.4 Work deemed by the Consultant to be unsatisfactory shall be replaced at no additional cost.

3.4 DELIVERY STORAGE AND HANDLING

.1 Deliver all materials to site in an orderly fashion.

.2 Store all materials in a clean and dry place, secure from vandalism or theft. All materials shall be left in shipping containers until required for use.

.3 Provide additional protection such as tarps, padding, wood skids, etc., as required to ensure protection of equipment and as directed by the Architect.

3.5 CONDUIT SLEEVES AND HOLES

.1 Install conduit, and sleeves, prior to pouring of concrete. Sleeves through concrete shall be sized for free passage of conduit.

.2 Holes through exterior walls and roof shall be flashed and made weatherproof.

.3 Make necessary arrangements for cutting of chases, drilling of holes and other structural work required to install electrical conduits, cables, pullboxes and outlet boxes.

.4 Install cables, conduits, and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

.5 Provide a minimum of two (2) separate conduit sleeves embedded in each concrete lighting fixture base. At least one (1) unused conduit shall be for possible future extension of wiring.

.6 All conduits and cables shall be entered into the building above grade unless otherwise noted.

.7 All coring in buildings with electrical in the slab shall be scanned at contractor’s expense to prevent damage.

3.6 CUTTING AND PATCHING

.1 Pay the costs of all cutting and patching required for the installation of electrical work. Payment for cutting and patching shall be made through the General Contractor.

.2 Cutting and patching required for the installation of electrical work shall be done by the particular trade whose work is involved. No cutting or patching shall be carried out by the tradesman employed on the electrical work.

.3 Obtain the approval of the Architect before arranging for any cutting. Patching shall restore the affected area to the original condition; materials and methods used for patching shall be in accordance with the requirements of the corresponding Divisions of the specification.

3.7 DEVICE/EQUIPMENT INSTALLATION

.1 Device/equipment location and mounting:

.1 Locate devices as indicated.

.2 Do not install devices back-to-back in wall.

.3 Drawings are schematic only and do not indicate all architectural or structural elements.

.4 Outlets or equipment shall be moved to any point within a 3 m (10'-0") radius when the consultant requests relocation prior to closing of wall framing, without additional cost.

.5 Locate manual lighting controls on latch side of doors.

.6 Vertically align devices of different systems when shown near each other and occurring at different mounting heights.

.7 Coordinate mounting heights and location of all devices/equipment with all discipline contract documents prior to installation of rough-in boxes.

.8 Panelboards and similar equipment including control panels intended to be surface mounted shall be installed on minimum 19 mm (3/4") good one side, fir plywood mounting backboards. Treat backboards with wood preservative prior to installation and paint with primer and two (2) coats gray enamel before any equipment is mounted. Provide plywood mounted boards unless specified otherwise in other sections.

.9 Panelboards and similar equipment including control panels mounted on exterior concrete/block walls shall have minimum 19 mm (3/4") air gap behind enclosure (to minimize condensation).

.10 All transformers, motor control centers and floor-mounted distribution panels shall be mounted on 100 mm (4") concrete housekeeping pads. The Electrical Contractors shall be responsible for provision of these pads.

.2 Mounting heights

.1 Mounting height of equipment is from finished floor to centre line of equipment unless indicated otherwise.

.2 If mounting height of equipment is not indicated, verify before installation.

.3 Coordinate all mounting heights with Architectural elevations.

.4 Where installed in block or brick, mounting heights shall be as above or at bottom of nearest course.

.5 Install devices/equipment at the following heights unless indicated otherwise:

.1 Receptacles and similar devices:

.1 General height (accessible height): 450 mm (18")

.2 Above continuous baseboard heater: 200 mm (8")

.3 Above counters: 150 mm (6"); Note-4

.4 Service and utility spaces: 1000 mm (39")

.5 Exterior: 1000 mm (39") AFG

.2 Communications outlets and similar devices:

.1 General height (accessible height): 450 mm (18")

.2 Above continuous baseboard heater: 200 mm (8")

.3 Above counters: 150 mm (6"); Note-4

.4 Service and utility spaces: 1000 mm (39")

.3 Luminaires:

.1 Suspended: Unless indicated otherwise, refer to architectural.

.2 Wall mounted: Unless indicated otherwise, refer to architectural.

.4 Lighting controls:

.1 General (accessible height): 1150 mm (45")

.2 Occupancy sensors (switch based, manual): 1150 mm (45")

.3 Barrier free (accessible) suites: 900 mm (36")

.5 Emergency lighting:
- .1 Exit signage: 25 mm (1”); Note-5
- .2 Battery units:
  - .1 2350 mm (92”); Note-1, or
  - .2 150 mm (6”); Note-2
- .3 Remote heads:
  - .1 2350 mm (92”); Note-1 or
  - .2 150 mm (6”); Note-2

.6 Fire alarm:
- .1 Control panels, annunciators: 2000 mm (78”); Note-1
- .2 Manual stations: 1150 mm (45”)
- .3 Signal devices (visual and audible):
  - .1 2350 mm (92”); Note-1, or
  - .2 150 mm (6”); Note-2
- .4 Telephone handsets: 1500 mm (59”)

.7 Automatic door operators:
- .1 Controller box: Refer to architectural.
- .2 Pushbutton control (button type): 900 mm (36”)
- .3 Pushbutton control (bar type): Refer to architectural.
- .4 Key switch (line voltage): 1550 mm (61”)
- .5 Key switch (low voltage): 1150 mm (45”)
- .6 Push-to-lock (PTL) pushbutton: 900 mm (36”)
- .7 Occupied-when-lit (OWL) indicator: 25 mm (1”); Note-5

.8 Access control:
- .1 Keypads: 1150 mm (45”)
- .2 Proximity readers: 900 mm (36”)
- .3 Exit pushbuttons: 1150 mm (45”)
- .4 Exit motion detectors: 25 mm (1”); Note-5
- .5 Control panels: 2000 mm (79”); Note-1

.9 Intrusion detection:
- .1 Keypads: 1150 mm (45”)
- .2 Keypads with integrated proximity readers: 900 mm (36”)
- .3 Motion detectors:
  - .1 2350 mm (92”); Note-1 OR
  - .2 150 mm (6”); Note-2
- .4 Glass break sensors:
- .5 Control panels: 2000 mm (79”); Note-1

.10 Clocks:
- .1 2150 mm (84”) OR
- .2 150 mm (6”); Note-2

.11 Electrical distribution and branch circuit panels:
- .1 General: 2000 mm (79”); Note-1

.2 Where panels taller than 1800 mm (72”): No more than 100 mm (4”) AFF.

.3 Enclosed circuit breakers: 1600 mm (63”); Note-3

.12 Electric heat and controls:

.1 Thermostats:

.1 General (accessible height): 1150 mm (45”)

.2 Barrier free (accessible) suites: 900 mm (36”)

.13 Hand dryers: 1150 mm (45”)

.14 Intercom and paging:

.1 Intercom stations: 1150 mm (45”)

.2 Wall mounted speakers:

.1 2150 mm (84”), or

.2 150 mm (6”); Note-2

.6 Notes (Note-X):

.1 Measured to top of device/equipment.

.2 Measured from ceiling to top edge of device/equipment where mounting height would be lower than required specification.

.3 Measured to operating handle of device/equipment.

.4 Coordinate counter backsplash heights with architectural drawings prior to rough-in. Maintain minimum 1” clearance above backsplash height.

.5 Measured above door trim to underside of device/equipment.

.6 Measured to bottom of device/equipment.

3.8 CIRCUITING

.1 Circuiting is representational only within a panel only. Circuit all electrical equipment and devices to their individually respective, intended panels.

3.9 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads operating at time of measurement. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, at completion of work, a report listing phase and neutral currents on panelboards, transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

.4 Include load balance test results in maintenance manuals.

3.10 TESTING

.1 Conduct and pay for tests including, but not limited to, the following systems:

.1 High voltage distribution equipment in accordance with relevant sections of specification.

.2 Power generation and distribution system.

.3 Circuits originating from branch distribution panels.

.4 Lighting and its control.

.5 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.6 Heating cables and mats.

.7 Systems:

.1 Fire Alarm

.2 Public Address

.3 Communication cabling systems.

.4 Intrusion Detection

.5 Access Control

.6 CCTV

.7 Nursecall

.8 Grounding systems.

.2 Insulation Resistance Testing

.1 Hi-pot all H.V. cable and equipment over 600 volts, to manufacturer's specifications.

.2 Megger circuits, feeders and equipment up to 350V with a 500V instrument.

.3 Megger 350-600V circuits, feeders and equipment with a 1000V instrument.

.4 Check resistance to ground before energizing.

.3 Furnish Manufacturer's Certificate or letter confirming that entire installation, as it pertains to each system, has been installed to manufacturer's instructions. Submit letter in accordance with this section.

.4 Carry out tests in presence of Consultant where directed.

.5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.6 Submit test results in Maintenance Manuals.

3.11 CARE, OPERATION AND START-UP

.1 Instruct The City of Winnipeg's operating personnel in the operation, care and maintenance of equipment. Arrangement of such instructional sessions shall be done at a time convenient to The City of Winnipeg.

.2 Arrange and pay for services of Manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.

.3 Provide these services for such a period, and for as many visits as necessary to put equipment into operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

3.12 CLEANING

.1 Final cleaning shall be done in accordance with the specification.

.2 Final cleaning shall include, but not be limited to, all lighting reflectors, lenses, and other lighting surfaces that have been exposed to dust and dirt throughout the course of construction.

.3 Clean surfaces that have been exposed to dust and debris throughout construction.

.4 Remove dirt and debris from enclosures.

.5 Clean electrical parts to remove conductive and deleterious materials.

.6 Clean finishes and touch-up damage.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Electrical demolition.

1.2 RELATED SECTIONS

.1 Section 02 41 19 - Selective Demolition.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Refer to 26 05 00 - Common Work Results for Electrical.

.2 Verify field measurements and circuiting arrangements are as shown on Drawings.

.3 Verify that abandoned wiring and equipment serve only abandoned facilities.

.4 Electrical drawings are based on existing record documents and/or casual field observations. Coordinate full extent of demolition work with all disciplines. Coordinate on site with all trades prior to commencement of demolition.

.5 Report discrepancies to the Consultant, and City of Winnipeg before disturbing the existing installation.

.6 Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

.1 Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

.2 Reroute/extend/re-feed existing electrical as required to maintain existing systems not indicated to be removed.

.3 Coordinate utility service outages with Utility Company.

.4 Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

.5 Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switch overs and connections. Obtain permission from The City of Winnipeg at least forty eight (48) hours before partially or completely disabling system. Disable system at a time suitable to The City of Winnipeg only. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area as required.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

.1 Demolish and extend existing electrical work to this Section and as indicated.

.2 The construction documents indicate major items of equipment, fixtures and devices, that exist and may not indicate every item or supporting wiring and conduit to be removed and/or relocated.

.3 Carefully examine the site and construction documents to verify the extent of work defined in the construction documents. Be responsible for determining which existing equipment and/or devices are to be removed and/or relocated.

.4 Remove, relocate, and extend existing installations to accommodate new construction including all existing equipment and/or devices indicated within the construction documents.

.5 Where existing equipment and/or devices are to be temporarily relocated, coordinate the required structure to support the equipment.

.6 Remove abandoned wiring to source of supply.

.7 Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

.8 Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

.9 Disconnect and remove abandoned panelboards and distribution equipment.

.10 Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

.11 Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

.12 Repair adjacent construction and finishes damaged during demolition and extension work.

.13 Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

.14 Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.4 PANELBOARDS

.1 Existing panelboards shall be retrofitted to accommodate new sprinklers. Provide mechanically fastened manufacturer approved drip hoods for all surface mounted panelboards. Seal existing conduit and wiring penetrations for all surface mounted panelboards with weatherproof connectors. All work shall be conducted in accordance to approved methods by the authority having jurisdiction.

3.5 CLEANING AND REPAIR

.1 Clean and repair existing materials and equipment which remain or are to be reused.

.2 Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts, broken electrical parts and lenses.

3.6 FINISHES

.1 Clean, prime and paint exposed wiring, conduit, junction and pull boxes, hangers, racking, and fasteners to prevent rusting and to match existing finishes where applicable.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Building wire and cable.

.2 Armoured cable.

.3 Wiring connectors and connections.

1.2 RELATED SECTIONS

.1 Section 26 05 53 - Electrical Identification.

.2 Section 31 23 18 - Trenching: Trenching and backfilling for direct burial cable installation.

1.3 REFERENCES

.1 CSA-C22.1-21 - Canadian Electrical Code, Part I (25th Edition), Safety Standard for Electrical Installations.

.2 C22.2 No. 0.3-09 (R2014) - Test Methods for Electrical Wires and Cables.

.3 CSA C22.2 No. 51-14 - Armoured Cables.

.4 CAN/CSA-C22.2 No. 65-18 - Wire Connectors.

.5 NECA (National Electrical Contractors Association) - National Electrical Installation Standards (NEIS).

.6 NETA (InterNational Electrical Testing Association) - ANSI/NETA ATS-2017 - Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems.

.7 CSA (Canadian Standards Association).

.8 ULC (Underwriters' Laboratories of Canada).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

1.5 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide for Fire Rated Cable.

1.6 STORAGE, AND HANDLING

.1 Cables shall be stored and handled in accordance with manufacturer's recommendations.

1.7 CLOSEOUT SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Record Documentation:

.1 Record actual locations of components and circuits.

.2 Record routing of all equipment and panelboard feeders.

.3 Testing

.1 Fire Rated Cabling

.4 Manufacturer's Certification and Extended Warranty

.1 Fire Rated Cabling

1.8 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

1.9 REGULATORY REQUIREMENTS

.1 Conform to CSA-C22.1.

.2 Provide products listed and classified by CSA or ULC and as suitable for the purpose specified and indicated.

1.10 PROJECT CONDITIONS

.1 Conductor sizes are based on copper unless indicated as aluminum or "AL".

.2 If aluminum conductor is substituted for copper conductor, size to match circuit requirements for conductor ampacity and voltage drop.

PART 2 PRODUCTS

2.1 BUILDING WIRE AND CABLE

.1 Description: Single conductor insulated wire RW90.

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 600 volts.

.4 Insulation: Cross-Linked Polyethylene material rated 90 degrees C.

2.2 ARMOURED CABLE (AC90)

.1 Description: Type AC90.

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 600 volts.

.4 Insulation Temperature Rating: 90 degrees C (_ degress F).

.5 Insulation Material: Cross-Linked Polyethylene.

.6 Rating: CSA FT4

2.3 CONNECTORS

.1 Pressure type connectors, fixture type splicing connectors, cable clamps and lugs, as required.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify that field measurements are as indicated.

.3 Verify that interior of building has been protected from weather.

.4 Verify that mechanical work likely to damage wire and cable has been completed.

.5 Verify that raceway installation is complete and supported.

3.2 PREPARATION

.1 Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

.1 Concealed Dry Interior Locations: Use only armoured cable, armoured cable wet underground, metal clad cable, or building wire in raceway.

.2 Exposed Dry Interior Locations: Use only building wire in raceway.

.3 Above Accessible Ceilings: Use only armoured cable, armoured cable wet underground, metal clad cable, or building wire in raceway.

.4 Wet or Damp Interior Locations: Use only armoured cable wet underground, metal clad cable, or building wire in raceway.

.5 Exterior Locations: Use only armoured cable wet underground, metal clad cable, or building wire in raceway.

.6 Underground Installations: Use only armoured cable, armoured cable wet underground, or building wire in raceway.

.7 Use wiring methods indicated.

3.4 INSTALLATION

.1 Route wire and cable as required to meet project conditions.

.2 Install cable to the CSA-C22.1.

.3 Use solid conductor for feeders and branch circuits 10 AWG and smaller.

.4 Use stranded conductors for control circuits.

.5 Use conductor not smaller than 12 AWG for power and lighting circuits and sized for maximum 3% voltage drop as per the following Table:

Maximum Conductor Length for 120V Branch Circuits

Breaker Size[A]	Conductor	
	Size [AWG]	Max Length [m]
15A	#12	20
	#10	35
	#8	55

	#6	90
20A	#12	15
	#10	25
	#8	40
	#6	65
	#4	110
30A	#10	15
	#8	25
	#6	45
	#4	70

.1 Where conductors are required to meet voltage drop requirements that are too large for proper termination at breakers or end devices, a transition to a suitable sized conductor may be made within 3m (10') of the termination with a minimum smaller conductor size of #10AWG.

.6 Use conductor not smaller than 16 AWG for control circuits.

.7 Pull all conductors into raceway at same time.

.8 Use suitable wire pulling lubricant for building wire 4 AWG and larger.

.9 Protect exposed cable from damage.

.10 All cable routed below grade shall enter/exit the building below grade unless noted otherwise.

.11 Where cabling is installed on building exterior, or direct buried, make provision for differential settling of exterior grade, buildings, and other structures and supports. Provide slack within cabling systems as required.

.12 Support cables above accessible ceiling, using spring metal clips to support cables from structure. Do not rest cable on ceiling panels.

.13 Single conductor cables shall be installed one cable diameter apart on suspended cable tray or channel supports and shall be clamped with aluminum cable clamps. Cables shall be terminated using non-magnetic connectors and shall be watertight for top entry. Cable armour shall be grounded via an aluminum plate at the supply end and isolated via an insulating plate, at the load end of the cable. A #3/0 AWG insulated (unless otherwise noted) copper ground wire shall be installed with each set of feeder cables. Cable bending radius shall be at least twelve times the overall cable diameter and bend shall not damage or distort the outer sheath.

.14 Armoured cable shall be used for connections from conduit systems to recessed luminaires in accessible ceilings. Cable shall be of sufficient length to allow the lighting fixture to be relocated to any location within an 1800mm (6') radius. Cable shall be clamped before entering the lighting fixture and shall be clipped before entering the conduit system junction box. (Minimum requirements).

.15 Use suitable cable fittings and connectors.

.16 Use bonding bushings at both ends of armoured cables.

.17 Neatly train and lace wiring inside boxes, equipment, and panelboards.

.18 Clean conductor surfaces before installing lugs and connectors.

.19 Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

.20 Aluminum Conductors

.1 Terminate aluminum conductors with tin-plated aluminum- bodied compression connectors only. Fill with anti- oxidant compound before installing conductor.

.2 Use suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.

.21 Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

.22 Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

.23 Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

.24 Identify wire and cable to Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Wall and ceiling outlet boxes.

.2 Pull and junction boxes.

1.2 RELATED SECTIONS

.1 Section 26 27 26 - Wiring Devices.

.2 Section 26 27 16 - Cabinets And Enclosures.

1.3 REFERENCES

.1 CSA-C22.1-21 - Canadian Electrical Code, Part I (25th Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No. 18.1-13 (R2018) - Metallic Outlet Boxes.

.3 CSA C22.2 No. 40-17 - Junction and Pull Boxes.

.4 CSA C22.2 No. 85-14 - Rigid PVC Boxes and Fittings.

.5 CSA (Canadian Standards Association).

.6 ULC (Underwriters' Laboratories of Canada).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate installation of outlet box for equipment connected under Section 26 05 80.

1.5 CLOSEOUT SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Record Documentation: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.6 REGULATORY REQUIREMENTS

.1 Products: Listed and classified by CSA or ULC, and as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 OUTLET BOXES

.1 Sheet Metal Outlet Boxes: CSA-C22.2 No. 18, galvanized steel.

.1 Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 13 mm (1/2 inch) male fixture studs where required.

.2 Concrete Ceiling Boxes: Concrete type.

.2 Non-metallic Outlet Boxes: CSA-C22.2 No. 18.

.3 In-wall Boxes: 18 gauge white powder coated steel complete with trim ring, will accept standard single gang outlet boxes, wiring devices and cover plates, complete with screw-on steel cover with cable exit.

2.2 PULL AND JUNCTION BOXES

.1 Sheet Metal Boxes: CSA-C22.2 No. 18, galvanized steel.

.2 Hinged Enclosures: As specified in Section 26 27 16.

.3 Surface Mounted Cast Metal Box: CSA-C22.2 No. 18, Type 4 or Type 6 as required or as indicated; flat-flanged, surface mounted junction box:

.1 Material: Galvanized cast iron.

.2 Cover: Provide with ground flange, neoprene gasket, and stainless steel cover screws.

.4 In-Ground Cast Metal Box: CSA-C22.2 No. 18, Type 6, flanged, recessed cover box for flush mounting:

.1 Material: Galvanized cast iron.

.2 Cover: Non-skid cover with neoprene gasket and stainless steel cover screws.

.3 Cover Legend: "ELECTRIC".

.5 Fibreglass Hand Holes: Die moulded glass fibre hand holes:

.1 Cable Entrance: Pre-cut 150 x 150 mm (6 x 6 inch) or as indicated, cable entrance at centre bottom of each side.

.2 Cover: Glass fibre weatherproof cover with non-skid finish.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify locations of floor boxes and outlets throughout prior to rough-in.

3.2 INSTALLATION

.1 Install boxes to CSA-C22.1.

.2 Install in locations as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

.3 Set wall mounted boxes at elevations to accommodate mounting heights specified in section for outlet device and as indicated. Coordinate locations with architectural drawings.

.4 Electrical boxes are shown on drawings in approximate locations unless dimensioned. Adjust box location up to 3 m (10 ft) if required to accommodate intended purpose.

.5 Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

.6 Maintain headroom and present neat mechanical appearance.

.7 Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

.8 Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 150 mm (6 inches) from ceiling access panel or from removable recessed luminaire.

.9 Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

.10 Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

.11 Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

.12 Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

.13 Use flush mounting outlet box in finished areas.

.14 Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

.15 Do not install flush mounting box back-to-back in walls; provide minimum 150 mm (6 inches) separation. Provide minimum 600 mm (24 inches) separation in acoustic rated walls.

.16 Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

.17 Use stamped steel bridges to fasten flush mounting outlet box between studs.

.18 Install flush mounting box without damaging wall insulation or reducing its effectiveness.

.19 In-wall boxes:

.1 Use in-wall boxes for wall mounted television and smart board power and communications applications.

.20 Do not install in-wall box back-to-back in walls; provide minimum 150 mm (6 inches) separation. Provide minimum 600 mm (24 inches) separation in acoustic rated walls.

.21 Secure in-wall box to interior wall and partition studs. Accurately position to allow for surface finish thickness. Use stamped steel bridges to fasten in-wall outlet box between studs.

.22 Install in-wall mounting box without damaging wall insulation or reducing its effectiveness.

.23 Use adjustable steel channel fasteners for hung ceiling outlet box.

.24 Do not fasten boxes to ceiling support wires.

.25 Support boxes independently of adjacent or connecting conduit systems.

.26 Use gang box where more than one device is mounted together.

.27 Use gang box with plaster ring for single device outlets.

.28 Use cast outlet box in exterior locations where exposed to the weather and wet locations.

.29 Set floor boxes level.

.30 Large Pull Boxes: Where pull boxes have a long dimension of 305 mm (12 inches) or more, use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

.31 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.32 Vacuum clean interior of outlet boxes before installation of wiring devices.

.33

3.3 ADJUSTING

.1 Adjust floor box flush with finish flooring material.

.2 Adjust flush-mounting outlets to make front flush with finished wall material.

.3 Install knockout closures in unused box openings.

3.4 CLEANING

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Clean interior of boxes to remove dust, debris, and other material.

.3 Clean exposed surfaces and restore finish.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Nameplates and labels.

.2 Wire markers.

.3 Conduit markers.

1.2 REFERENCES

.1 CSA (Canadian Standards Association).

.2 ULC (Underwriters' Laboratories of Canada).

1.3 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide catalogue data for nameplates, labels, and markers.

.3 Installation Data: Provide list of all equipment requiring nameplates complete with associated nameplate configuration for review.

1.4 REGULATORY REQUIREMENTS

.1 Provide products listed and classified by CSA or ULC and as suitable for purpose specified and shown.

1.5 LANGUAGE

.1 All identification shall be in English.

PART 2 PRODUCTS

2.1 NAMEPLATES AND LABELS

.1 Nameplates:

- .1 Exterior –Stainless steel, etched and color filled with stamped product specific labelling.
- .2 Interior - Engraved three-layer laminated plastic, white letters on blue background for normal power and systems, white letters on red background for life safety power and systems, and white letters on orange background for standby power and systems.
- .3 Locations:
  - .1 Circuit breakers and fused switches which directly feed a single conductor cable shall include the maximum continuous load allowed:
    - .1 "MAXIMUM CONTINUOUS LOAD: X AMPS"
  - .2 Adjustable circuit breakers shall include the maximum continuous load allowed:
    - .1 "MAXIMUM CONTINUOUS LOAD: X AMPS"
  - .3 Mechanical equipment disconnect switches:

.1 Nameplate shall include:

.1 Mechanical Equipment Mark

.2 Panel Name & Circuit number

.4 Letter Size:

.1 Use 6 mm (1/4 inch) letters for identifying equipment mark designations and system types.

.2 Use 3 mm (1/8 inch) letters for identifying supporting information.

.3 Use 6 mm (1/4 inch) letters for identifying grouped equipment and loads.

.5 Nameplates on exterior equipment shall be UV & weather resistant.

.6 Wording on nameplates shall be approved prior to manufacture. Submit schedule of nameplates and wording.

.2 Labels: Plastic self-adhesive non-smear labels with 5 mm (3/16 inch) black letters on white background.

.1 Locations:

.1 Wiring devices, including lighting control devices and receptacles.

.1 Label shall include:

.1 Indicate associated panel and circuit number.

.2 E.g. “A-32” (A is for Panel-A, and 32 is the circuit number)

.3 Lighting controls to include brief description of lighting being controlled.

.4 E.g. “Pendants”

2.2 WIRE MARKERS

.1 Wire Markers: Permanent tape type wire markers not susceptible to thermal or mechanical influence.

.2 Locations:

.1 Each conductor at panelboard gutters, pull boxes, outlet and junction boxes and each load connection.

.1 Legend:

.1 Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

.2 Control Circuits: Control wire number indicated on Shop Drawings.

2.3 CONDUIT MARKERS

.1 Manufacturers:

.1 Brady; Product: BMP71 Indoor/Outdoor Vinyl Labels.

.2 Substitutions: Refer to Section 26 05 00.

.2 Description: Vinyl label.

.3 Location: Provide markers for each conduit longer than 4.7 m (10 ft).

.4 Spacing: 6 m (20 ft) on centre.

.5 Colour:

.1 Normal Power System: Blue

.6 Legend:

.1 600 Volt System: 600V.

.2 120/208 Volt System: 120/208V.

2.4 UNDERGROUND WARNING TAPE

.1 Manufacturers: Brady

.1 Product: Detectable Identoline.

PART 3 EXECUTION

3.1 PREPARATION

.1 Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

.1 Install nameplate and label parallel to equipment lines.

.2 Secure nameplate to equipment front using rivets or screws.

.3 Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

.4 Conduit shall be integrally colour coded through a colouring process applied by the conduit manufacturer.

.5 Identify conduit using field painting to Section [09 91 10].

.6 Paint coloured band on each conduit longer than 2 m (6 ft).

.7 Paint bands 6 m (20 ft) on centre.

.8 Colour:

.1 600 Volt System: Orange

.2 208 Volt System: Blue

.3 Fire Alarm System: Red.

.4 Communication System: Yellow

.5 Security Systems: Black

.6 Nursecall Systems: Purple

.7 Controls System: White

.9 Identify underground conduits using underground warning tape. Install one tape per trench at 75 mm (3 inches) below finished grade.

.10 Provide identification on all junction box covers indicating associated system, panel and circuit numbering using permanent marker.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Electrical connections to equipment specified under other sections.

1.2 RELATED SECTIONS

.1 Section 11 40 00 - Food Service Equipment.

.2 Section 26 05 33 - Conduit.

.3 Section 26 05 19 - Building Wire And Cable.

.4 Section 26 05 34 - Boxes.

1.3 REFERENCES

.1 CSA-C22.1-21 - Canadian Electrical Code, Part I (25th Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No. 127-18 - Equipment and Lead Wires.

.3 ANSI/NEMA WD 6-2016 Wiring Devices—Dimensional Specifications.

.4 NEMA WD 1-1999 (R2015) - General Colour Requirements for Wiring Devices.

.5 CSA (Canadian Standards Association).

.6 ULC (Underwriters' Laboratories of Canada).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Obtain and review shop drawings, product data, and manufacturer's instructions for equipment provided under other sections.

.3 Determine connection locations and requirements.

.3 Sequencing:

.1 Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.

.2 Sequence electrical connections to coordinate with start-up schedule for equipment.

1.5 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide wiring device manufacturer's catalogue information showing dimensions, configurations, and construction.

1.6 REGULATORY REQUIREMENTS

.1 Products: Listed and classified by CSA or ULC, and as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 MECHANICAL EQUIPMENT CONNECTIONS

.1 Include motor starters, disconnects, conduit, wire, fittings, interlocks, outlet boxes, junction boxes, and all associated equipment required to provide power wiring for mechanical equipment, unless otherwise indicated.

.2 Include pushbutton stations, motor protective switches, interlocks, conduit, wire, devices, and fittings required to provide control wiring for mechanical equipment, except for temperature/humidity control systems.

.3 Unless otherwise noted, motors and control devices shall be supplied by Division 21, 22, and 23. Motor horsepower ratings shall be as shown in the Division 21, 22, and 23 specifications.

.4 Provide the Mechanical Contractor with a copy of the Motor Schedule and ensure conformance with voltage shown.

.5 All equipment, mounted on the exterior of the building, shall be weatherproof.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 ELECTRICAL CONNECTIONS

.1 Make electrical connections to equipment manufacturer's written instructions.

.2 Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations.

.3 Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.

.4 Provide receptacle outlet where connection with attachment plug is indicated or as required. Provide cord and cap where field-supplied attachment plug is indicated or as required.

.5 Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

.6 Install disconnect switches, controllers, control stations, and control devices as indicated or as required by the manufacturer of the associated equipment.

.7 Modify equipment control wiring with terminal block jumpers as indicated or as required.

.8 Mechanical Equipment:

.1 Power Wiring

.1 Install power feeders, starters, disconnects, and associated equipment and make connections to all mechanical equipment.

.2 Wire and connect all loose line and load side reactors to associated drives as required. Coordinate locations and quantities with mechanical contractor.

.3 Install branch circuit wiring for mechanical system control panels, time clocks, and control transformers.

.4 Install main power feeders to starter/control panels furnished by Division 21, 22, and 23. Install branch wiring from starter/control panels to controlled equipment such as motors, electric coils, etc.

.5 Flexible connections to motors shall not exceed 6 feet (1.83 m), unless approved by Consultant.

.2 Controls

.1 Install all electrical controls as indicated on the drawing schedules.

.2 Wire and connect line voltage remote thermostats and P/E switches for furnaces, condensing units, force flows, gas-fired unit heaters, electric heaters and rooftop units.

.3 Wire and connect float switches, pressure switches, alternators, alarms, etc. for sump pumps, sewage pumps, domestic hot water recirculating pumps, booster pumps, jockey pumps and compressors.

.4 Wire and connect electrical interlocks for starters supplied by Division 21, 22, and 23.

.5 Wire and connect hi-limit cutouts for remotely mounted electric heating coils provided by Division 21, 22, and 23.

.3 Disconnects

.1 Disconnects shall be mounted independently from the equipment that it's serving.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Receptacles.

1.2 RELATED SECTIONS

.1 Section 26 05 34 - Boxes.

1.3 REFERENCES

.1 CSA-C22.1-21 - Canadian Electrical Code, Part I (25th Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No. 42-10 (R2015) - General Use Receptacles, Attachment Plugs, and Similar Wiring Devices

.3 CSA C22.2 No. 42.1-13 (R2017) - Cover Plates for Flush-Mounted Wiring Devices.

.4 CSA C22.2 No. 55-15 - Special use switches.

.5 CAN/CSA C22.2 No. 111-18 - General-Use Snap Switches.

.6 CSA C22.2 No. 184-15 - Solid-State Lighting Controls.

.7 CSA (Canadian Standards Association).

.8 ULC (Underwriters' Laboratories of Canada).

1.4 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide manufacturer's catalogue information showing dimensions, colours, and configurations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Extra Stock Materials:

.1 Provide two (2) of each style, size, and finish wall plate.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

1.7 REGULATORY REQUIREMENTS

.1 Provide products listed and classified by CSA and as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 RECEPTACLES

.1 Manufacturers:

.1 Leviton

.2 Hubbell

.3 Cooper

.4 Legrand

.5 Substitutions: Refer to Section 01 62 00.

.2 General-duty duplex convenience receptacle:

.1 Grade: Commercial Specification Grade, Nema WD-6 Compliant, CSA-C22.2 No.42.

.2 Style: Standard

.3 Device Body: Smooth white nylon face and base.

.4 CSA Configuration: Type as specified and indicated.

.5 Tamper resistant as indicated or as per Electrical Code.

.3 GFCI Receptacle: Duplex receptacle with integral ground fault circuit interrupter to meet regulatory requirements complete with steady-on “Green-Power-On” and steady-on “Red-Power-Tripped Off” LED indicator lights. Washroom GFCI shall be complete with integral photo sensor controlled night light.

.4 Exterior Use Receptacle: Extra Heavy Duty Industrial grade duplex receptacle with integral ground fault circuit interrupter to meet regulatory requirements complete with steady-on “Green-Power-On” and steady-on “Red-Power-Tripped Off” LED indicator lights complete with UV and corrosion resistant device body complete with CSA 5-20R configuration only.

.5 Suitable for No. 10 AWG for back and side wiring.

.6 Break-off links for use as split receptacles.

.7 Double wipe contacts and riveted grounding contacts.

.8 Receptacles shall be of one manufacturer throughout the project.

2.2 WALL PLATES

.1 Nylon Cover Plate: Impact resistant unbreakable nylon with reinforcing ribs. Style and color shall match wiring device. Combination or multi-gang covers as required or indicated. Jumbo or standard size as indicated or specified.

.2 Standard Stainless Steel Cover Plate: 430 type stainless steel cover plate complete with protective plastic film. Combination or multi-gang covers as required or indicated. Jumbo or standard size as indicated or specified.

.3 Heavy Duty Stainless Steel Cover Plate: 302/304 type stainless steel cover plate complete with protective plastic film. Combination or multi-gang covers as required or indicated.

.4 Metallic While-in-Use covers: Nema 3R rated, die-cast aluminum construction with powder coated “chip resistant” paint corrosion protection and plug/cord management, suitable for horizontal mounting on device box only, and padlock provision.

.5 Thermoplastic While-in-Use covers: Nema 3R rated, thermoplastic construction, suitable for horizontal mounting on device box only, and padlock provision.

.6 Weatherproof Cover Plate: Gasketed cast metal with gasketed double hinged device covers suitable for horizontal mounting on device box only. Provide single hinged device cover for GFI type receptacle only.

2.3 ACCESSORIES:

.1 Audible Device Vandal Guard: Clear vandal resistant, UV Stabilized polycarbonate shield and frame complete with integral 95db piezo horn and battery. Flush mounted or surface as indicated. Outdoor rated as required. Vandal guard shall be equal to STI Stopper II series.

.2 Device Vandal Guard: Clear vandal resistant, UV Stabilized polycarbonate shield and frame. Flush mounted or surface as indicated. Outdoor rated as required. Vandal guard shall be equal to STI Stopper II series.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify that outlet boxes are installed at proper height.

.3 Verify that wall openings are neatly cut and will be completely covered by wall plates.

.4 Verify that floor boxes are adjusted properly.

.5 Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

.6 Verify that openings in access floor are in proper locations.

3.2 PREPARATION

.1 Provide extension rings to bring outlet boxes flush with finished surface.

.2 Clean debris from outlet boxes.

3.3 INSTALLATION

.1 Install to CSA-C22.1 and to manufacturer's written instructions.

.2 Install devices plumb and level.

.3 Install switches with OFF position down.

.4 Provide neutral conductor in box for all line voltage lighting control devices.

.5 Where circuits supplying receptacles are protected by an arc-fault circuit breaker, or arc-fault receptacle, provide dedicated neutral conductors for each circuit. Sharing of neutrals not permitted on arc fault circuits.

.6 Install wall dimmers to achieve full rating specified and indicated after de-rating for ganging as instructed by manufacturer.

.7 Do not share neutral conductor on load side of dimmers.

.8 Install receptacles with grounding pole on bottom.

.9 Use exterior use receptacles for exterior applications unless noted otherwise.

.10 Connect wiring device grounding terminal to branch circuit equipment grounding conductor and outlet box.

.11 Install locator pilot light for lighting controls located in crawlspace.

.12 Install indicator pilot light for all lighting controlled from a remote switch location. Switch and light shall be clearly labelled identifying the controlled lighting.

.13 Install decorative plates on switch, receptacle, and blank outlets in finished areas.

.14 Connect wiring devices by wrapping conductor around screw terminal.

.15 Use jumbo size plates for outlets installed in masonry walls.

.16 Stainless steel protective coverings shall be maintained until project completion and turn-over to City of Winnipeg.

.17 Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

.18 Install metallic While-In-Use covers on exterior receptacles.

.19 Install thermoplastic While-In-Use covers on receptacles located at residential suite balconies only.

.20 Use weatherproof covers for parking receptacles, and dust-tight applications only, or as indicated.

.21 Install protective rings on active flush cover service fittings.

3.4 FIELD QUALITY CONTROL

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Inspect each wiring device for defects.

.3 Operate each wall switch with circuit energized and verify proper operation.

.4 Verify that each receptacle device is energized.

.5 Test each receptacle device for proper polarity.

.6 Test each GFCI receptacle device for proper operation.

3.5 ADJUSTING

.1 Adjust devices and wall plates to be flush and level.

3.6 CLEANING

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Heating cable.

1.2 RELATED SECTIONS

.1 Section 03 30 00 - Cast-in-place Concrete.

.2 Section 07 71 23 - Manufactured Gutters And Downspouts.

1.3 PERFORMANCE REQUIREMENTS

.1 Pipe Trace Heating: Freeze protection with outside temperature at -40 degrees C (-40 degrees F).

.2 Snow Melting Installations: 500 W/sq m (45 W/sq ft) minimum, in protected areas.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Section 01 31 00: Project management and coordination procedures.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate installation of heating cable with installation of gutters.

.3 Pre-installation Meetings: Convene before starting work of this section.

.1 Require attendance of parties directly affecting the work of this Section.

.2 Review sequencing of installation, protection from damage of finished installation, location of expansion and control joints in concrete and building, and methods used for covering installations with insulation and concrete.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data for heating cable, mat and control components.

.3 Shop Drawings: Indicate mat and heating cable layout, locations of terminations, thermostats, and branch circuit connections.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Record Documentation: Accurately record actual locations of temperature sensors, heating cable, mat, thermostats, and branch circuit connections.

.3 Operation and Maintenance Data:

.1 Include description of operating controls.

.2 Include repair methods and parts list of components.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

.1 Manufacturers:

.1 nVent; Product: GM.

.2 Substitutions: Refer to Section 01 62 00.

2.2 HEATING CABLE

.1 Heating Cable: Self-limiting, parallel resistance heating cable.

.2 Rating: 120 and 208V, 5.2 W/lin ft.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Section 01 70 00: Verify existing conditions before starting work.

.2 Verify that ceiling framing, piping and concrete form work is ready to receive work.

.3 Verify field measurements are as shown on Shop Drawings.

.4 Verify that required utilities are available, in proper location, and ready for use.

.5 Beginning of installation means installer accepts conditions.

3.2 INSTALLATION

.1 Install to manufacturer's written instructions.

.2 Bending Radius: Six times cable diameter, minimum.

.3 Avoid pinching and making sharp bends in cable.

.4 Prevent damage by sharp rocks, metal, or other objects during installation.

.5 Do not install heating cable and mat across expansion or construction joints.

.6 Do not cross heating cable over itself.

.7 Cable Spacing in Concrete: 75 mm (3 inch) centres, minimum; 225 mm (9 inch) centres, maximum.

.8 Depth in Concrete: 50 mm (2 inches) below finished surface.

.9 Installation on Roof and in Ceiling: Do not begin until roofing work is complete. Route and fasten cable to manufacturer's written instructions. Select and install cable based on maximum safe temperature for materials used.

.10 Provide 30mA trip GFCI breaker(s) for all circuits feeding heating cables and mats.

3.3 FIELD QUALITY CONTROL

.1 Section 01 45 00: Field inspection and Testing.

.2 Test continuity of heating cable.

.3 Perform continuity and insulation resistance test on completed cable installation. For cables embedded in concrete, perform tests immediately before and after concrete placement.

.4 Measure voltage and current at each unit.

.5 Submit written test report showing values measured on each test for each cable.

3.4 CLOSEOUT ACTIVITIES

.1 Demonstration: Demonstrate operation of heating cable controls.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Fire alarm initiating and signaling devices.

.2 Modifications to existing system.

1.2 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical

.2 Section 26 05 19 - Building Wire and Cable.

1.3 REFERENCES

.1 The latest version of the following including all amendments:

.1 CAN/ULC S524 - Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC S525 - Audible Signal Devices for Fire Alarm Systems, Including Accessories.

.3 CAN/ULC S526 - Visible Signal Devices for Fire Alarm Systems.

.4 CAN/ULC S527 - Control Units for Fire Alarm Systems

.5 CAN/ULC S528 - Manual Pull Stations for Fire Alarm Systems.

.6 CAN/ULC S529 - Smoke Detectors for Fire Alarm Systems.

.7 CAN/ULC S530 - Heat Actuated Fire Detectors for Fire Alarm Systems.

.8 CAN/ULC S536 - Inspection and Testing of Fire Alarm Systems.

.9 CAN/ULC-S537 - Standard for Verification of Fire Alarm Systems.

.10 CAN/ULC S541 - Speakers for Fire Alarm Systems, Including Accessories.

.11 CAN/ULC S573 - Installation of Ancillary Devices Connected to Fire Alarm Systems

.12 CAN/ULC S1001 – Integrated Systems Testing of Fire Protection and Life Safety Systems”

.13 ULC ORD-C386-1990 - Flame Detectors.

1.4 SYSTEM DESCRIPTION

.1 Existing system:

.1 Single stage.

.2 Addressable.

.3 Manufacturer: Edwards EST.

.2 The system shall be modified and expanded to include, but not be limited to the following:

.1 Trouble signal devices.

.2 Integral and remote power supplies.

.3 Automatic alarm initiating devices

.4 Input and output modules

.5 Isolator modules

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide electrical characteristics and connection requirements.

.3 Shop Drawings:

.1 Provide control panel and annunciator layout

.2 Provide system wiring diagram showing each device and wiring connection required.

.1 Wiring diagram shall be specific to the project and shall meet manufacturers recommendations and required building codes and standards.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Maintenance Contracts: Provide service and maintenance of fire alarm system for one (1) year from Date of Substantial Completion.

.3 Operation Data: Operating instructions.

.4 Maintenance Data: Maintenance and repair procedures.

.5 Record Documentation: Record actual locations of initiating devices, signaling appliances, and end-of-line devices. Include zone number and device number for each device installed. Include circuit number for signalling appliances.

.6 Test reports from CAN/ULC-S536 and CAN/ULC-S537 verification testing.

.7 Test reports from CAN/ULC-S1001 Integrated Systems Testing of Fire Protection and Life Safety Systems.

1.7 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 40: Maintenance and extra material requirements.

1.8 QUALITY ASSURANCE

.1 Design and install fire alarm system to CAN/ULC S524.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum fifteen (15) years documented experience and with service facilities within 160 km (100 miles) of Project.

1.9 REGULATORY REQUIREMENTS

.1 Products Requiring Electrical Connection: Listed and classified by ULC and as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

.1 Existing manufacturer: Edwards EST:

.1 New product shall be fully compatible and listed for use with the existing system.

2.2 AUTOMATIC INITIATING DEVICES

.1 Duct Mounted Smoke Detector:

.1 General:

.1 Addressable.

.2 Photoelectric type.

.3 Indicator LED:

.1 Loop polling LED.

.2 Alarm LED.

.2 Sampling tube type:

.1 Suitable for mounting on square or round duct.

.2 Duct sampling tubes extending width of duct.

.3 Adjustable sensitivity:

.1 Sensitivity settings shall be controlled and adjusted through the control panel.

.4 Indicators shall be visible through duct detector external housing.

.5 Provide auxiliary relay contact as required or as indicated.

.6 Listed for 300 to 4,000 ft/min air velocity.

.7 Remote LED alarm indicator.

.3 Spot type:

.1 Listed for in-duct applications.

.2 Adjustable sensitivity.

.1 Sensitivity settings shall be controlled and adjusted through the control unit.

.3 Provide auxiliary relay contact as required or as indicated.

.4 Listed for 0 to 4,000 ft/min air velocity.

.5 Remote LED alarm indicator.

.2 Multi-Criteria Fire/CO Detector: Addressable combination detector combines smoke, CO, light/flame, and heat sensing technology in one device with adjustable sensitivity settings, and loop polling LED (Green). LED shall provide (Red) visual indication of detector actuation. Unit shall be complete with separate CO detection signal, and built-in CO cell end-of-life warning and fault. CO cell shall be listed for applications in life safety. Provide sounder base for local CO alarm only. Multi-Criteria Fire/CO Detector shall be equal to Notifier FCO-851(A).

.3 Stand-Alone CO Detector: Non-Addressable complete with an audible and visual alarm, test/silence switch, built-in CO cell end-of-life warning and alarm/trouble relay outputs connected to an addressable zone monitor module and supervised power supply from the battery-backed up fire alarm system. The detector shall be suitable for wall or ceiling mounting. CO detector shall be equal to System Sensor CO1224A.

2.3 MONITOR MODULES

.1 Fully addressable modules to facilitate the monitoring of auxiliary devices intended to be monitored for alarm, supervision and trouble conditions by the fire alarm system using normally open dry contacts.

2.4 CONTROL MODULES

.1 Fully addressable modules to facilitate the control of ancillary devices intended to be controlled by the fire alarm system using dry contacts.

2.5 ZONE MODULES

.1 Fully addressable modules to facilitate connecting conventional non-addressable devices to addressable circuits.

2.6 FAULT-ISOLATION MODULES

.1 Fully addressable fault-isolation modules on an SLC style device loop to identify wire-to-wire short circuits and to suit CAN/ULC S524 and CAN/ULC S537.

2.7 FIRE ALARM WIRE AND CABLE

.1 Fire Alarm Power Branch Circuits: Building wire as specified in Section 26 05 19.

.2 Initiating Device and Indicating Appliance Circuits:

.1 Description: Type FAS solid conductor, complete with red tinted interlocking armour as required

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 300 volts.

.4 Insulation: Coded PVC insulation and with overall red PVC jacket in accordance with the Canadian Electrical Code, rated 105 degrees C (_ degrees F). Use shielded cable as per manufacturer’s recommendations only.

.3 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.

.4 Wiring shall be as per manufacturer’s recommendations. All wiring shall be in conduit unless noted otherwise. [All wiring shall be armoured securex unless noted otherwise.]

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install to CAN/ULC S524.

.2 Install to manufacturers instructions and recommendations.

.3 Install to applicable codes and standards.

.4 Install as required or as indicated.

.5 Install at heights indicated in Section 26 05 00.

.6 Automatic detectors:

.1 Locate detectors minimum 450mm (18”) from air discharge or return grille as measured from the edge of the detector.

.2 Locate detectors minimum 300 mm (12”) from lighting fixtures.

.3 Locate detectors minimum 100mm (4”) from edge of ceiling where it meets the wall as measured from the edge of the detector.

.4 Located detectors such that a clear space of 450mm (18”) is maintained between the detector and any obstructions except where ceiling mounted obstructions protrude less than 100 mm (4”) from the ceiling.

.5 Where installed on unfinished ceilings, locate detectors on underside of floor deck or roof deck above.

.7 End-of-line devices:

.1 Install in separate box adjacent to last device in circuit.

.8 Make conduit and wiring connections to sprinkler valve tamper and flow switches, fire suppression system control panels, door release devices, smoke control fans and equipment.

.9 Circuiting for fire alarm devices shall be as follows:

.1 Provide Class “A” addressable initiating/alarm circuits throughout unless indicated otherwise.

.2 Provide Class “B” audible/visual signal circuits for signal circuits throughout unless indicated otherwise.

.3 Provide Class “A” audible/visual signal circuits for residential dwelling unit signal circuits only.

.10 Where wiring is required to be surface mounted within finished areas, wiring shall be installed in a single piece metal raceway unless noted otherwise. Color of raceway shall be white unless noted otherwise.

.11 Where devices are surface mounted in finished areas, provide a surface mounted metal raceway device box. Color of box shall match the device.

.12 Branch circuit breakers supplying fire alarm equipment shall be lockable in the “ON” position. A red lamacoid nameplate shall be affixed on the electrical panel adjacent the associated circuit breaker indicating “FIRE ALARM PANEL” or other approved wording.

.13 Install air sampling tubing in accordance with manufacturers recommendations and in keeping with schematic layouts where indicated in the drawings.

.14 Programming of room names and numbers shall match The City of Winnipeg’s name and numbering scheme.

3.2 WIRING METHODS

.1 Concealed Dry Interior Locations: Use FAS wire in raceway for all main runs. Armoured Securex for individual device drops only.

.2 Exposed Dry Interior Locations: Use only FAS wire in raceway.

.3 Above Accessible Ceilings: Use FAS wire in raceway for all main runs. Armoured Securex for individual device drops only.

.4 Wet or Damp Interior Locations: Use only FAS wire in raceway.

.5 Exterior Locations: Use only FAS wire in raceway.

.6 Underground Installations: Use only FAS wire in raceway.

3.3 INTERCONNECTIONS

.1 Interconnect with all systems and devices as identified on the drawings.

.2 Natural Gas Generator Gas Shutoff Valves

.1 Provide monitoring modules at all shutoff valves installed on the dedicated generator gas line from the utility shutoff valve to the equipment.

.2 Interface with generator controller to indicate general trouble on the generator control panel.

.3 Air Handling Units

.1 Where identified for control by the Fire Alarm System, provide interconnection to air handling unit control circuit where complete shutdown is required. Where additional control is required to achieve smoke control or evacuation, utilize interface to the building automation system. All control circuits shall be installed in accordance with CAN/ULC-S524 Standard for Installation of Fire Alarm Systems and the Canadian Electrical Code.

.2 All fire alarm relays and interfaces shall be installed within 3m of the air handling control unit.

.3 Provide interconnection and monitoring input of airflow feedback circuits on fans utilized for pressurization and smoke exhaust and control.

.4 Provide system status of each ventilation, smoke evacuation and smoke control system.

.5 Include the following at the display and controls package for each designated piece of equipment:

.1 Status LED to identify the designated equipment running.

.2 Supervised manual switch to turn the designated equipment off in a non-fire alarm condition.

.3 Supervised manual switch to turn the designated equipment on in a fire alarm condition.

.4 Manual switch to return the designated equipment to automatic operation (controlled by the fire alarm system)

3.4 FIELD QUALITY CONTROL

.1 Section 01 45 00 - Quality Control.

.2 Include services to supervise installation, adjustments, final connections, and system testing.

.3 Perform inspection, testing and verification to CAN/ULC-S536 and CAN/ULC-S537 and local inspection authority requirements.

.4 Inspection, testing and verification report shall include visual confirmation of all ancilliary devices connected to the fire alarm system. Confirmation of fire alarm relay contacts only is not sufficient.

.5 Include services to re-test system one (1) month prior to completion of warranty.

.6 Inspection, testing and verification of the system shall be carried out by qualified personnel only, who have completed the CFAA Fire Alarm Training Technician program and examination process and are a registered CFAA Fire Alarm Technician.

.7 Inspection, testing, and verification report shall include the names and signatures of the CFAA registered technicians who carried out the test.

3.5 CLOSEOUT ACTIVITIES

.1 Demonstration: Demonstrate normal and abnormal modes of operation and required responses to each.

.1 Demonstrate and document operating conditions of all interconnecte fire protection and life safety systems, including interconnected responses (fire alarm relay status only is not sufficient).

.2 Provide documented report meeting CAN/ULC S1001 requirements for all integrated fire protection and life safety systems, complete with but not limited to:

.1 Smoke Control

END OF SECTION